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TOTAL AMOUNT OF PAYMENT ($) 320.00

Complete if Known	
Application Number	09/680,345
Filing Date	10/05/2000
First Named Inventor	Baarman, et al
Examiner Name	Cuevas, Pedro J.
Group Art Unit	2834
Attorney Docket No.	3086/1230 (BH 2068)

METHOD OF PAYMENT

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number: 23-1925

Deposit Account Name: Brinks Hofer Gilson & Lione

☑ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

☐ Applicant claims small entity status. See 37 CFR 1.27

2. ☑ **Payment Enclosed:**

☑ Check ☐ Credit card ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	740	201	370	Utility filing fee	
106	330	206	165	Design filing fee	
107	510	207	255	Plant filing fee	
108	740	208	370	Reissue filing fee	
114	160	214	80	Provisional filing fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES

	Extra Claims		Fee from below	Fee Paid
Total Claims		-20** =		X =
Independent Claims		- 3** =		X =
Multiple Dependent				=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	84	202	42	Independent claims in excess of 3
104	280	204	140	Multiple dependent claim, if not paid
109	84	209	42	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	920	217	460	Extension for reply within third month	
118	1,440	218	720	Extension for reply within fourth month	
128	1,960	228	980	Extension for reply within fifth month	
119	320	219	160	Notice of Appeal	
120	320	220	160	Filing a brief in support of an appeal	320.00
121	280	221	140	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,280	241	640	Petition to revive - unintentional	
142	1,280	242	640	Utility issue fee (or reissue)	
143	460	243	230	Design issue fee	
144	620	244	310	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Processing fee under 37 CFR 1.17(q)*	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	740	246	370	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($) 320.00

SUBMITTED BY

Complete *(if applicable)*

Name (Print/Type)	Sanders N. Hillis	*Registration No. (Attorney/Agent)*	45,712	*Telephone*	317-636-0886
Signature				*Date*	04/21/2003

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Signature

PATENT
Our Case No. 3086/1230
(BH2068)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
David W. Baarman et al.

Serial No.: 09/680,345

Filed: October 5, 2000

For: HYDRO-POWER GENERATION SYSTEM FOR A WATER TREATMENT SYSTEM AND METHOD OF SUPPLYING ELECTRICITY USING A FLOW OF FLUID

Examiner: Pedro Cuevas

Group Art Unit: 2834

APPEAL BRIEF

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

This Appeal is in response to the Final Office Action mailed October 17, 2002. A Notice of Appeal and the required fee were filed on February 14, 2003. A check in the amount of $320.00 is enclosed for the fees associated with filing this Brief in support of the Appeal. No other fees are believed required, however, should any additional fees be deemed necessary, the Commissioner is hereby authorized to charge any additional fees or credit any overpayment to Deposit Account No. 23-1925.

TABLE OF CONTENTS

I. Real Party in Interest

Access Business Group International LLC is the real party in interest.

II. Related Appeals and Interferences

The undersigned is unaware of any other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 1, 3-18, 29, 32-41, 53-56 and 58-59 are pending and are the subject of this appeal.

IV. Status of Amendments

An amendment canceling claims 19-28, 42-43, 45-52 and 57 was entered by the Examiner based on instructions from the Applicants filed in an after final office action response mailed on December 13, 2002. The claims were cancelled to reduce the number of issues for appeal.

V. Summary of Invention

The invention is directed to a system for providing electrical power to a water treatment system (10) through hydroelectric power generation. One embodiment of the hydro-power generation system (12) illustrated in Figure 9, and outlined in claim 1, includes a housing (142), a rotor (112) and a stator (114). The housing (142) includes an inlet (144) and an outlet (146). The rotor (112) is rotatably positioned within the housing (142) such that the rotor (112) is rotated by a flow of fluid through the housing (142).

The hydro-power generation system (12) also includes a turbine nozzle (140) fixedly coupled with the housing (142). The turbine nozzle (140) includes a tip (158) and a plurality of struts (160) that are operable to direct the flow of liquid to the rotor (112) at increased velocity to rotate the rotor (112). The turbine nozzle (140) is operable to increase the velocity

and direct the flow of fluid to achieve a predetermined angle of incidence of the fluid upon the rotor (112). The stator (114) is fixedly positioned to surround the rotor (112) such that rotation of the rotor (112) induces the production of electricity. The electricity may be direct current, alternating current or rectified alternating current.

The hydro-power generation system (12) may also include a plurality of taps and an ultraviolet light source. The ultraviolet light source is energized with the electricity produced. The taps are dynamically operable to provide different voltage levels of electricity to initially energize and continue to energize the ultraviolet light source. The hydro-power generation system (12) may also include a plurality of coils (184). The coils (184) are dynamically switchable from a parallel configuration to a series configuration to provide a first voltage for initial energization and a second voltage for continued energization of the ultraviolet light source.

As detailed on page 26 lines 19–22, some ultraviolet light sources require a relatively low predetermined current and a relatively high predetermined voltage for initial energization. Following initial energization, the ultraviolet light sources require a relatively high predetermined current and a relatively low predetermined voltage to remain energized. Accordingly, the taps or coils (184) may be operated to supply the current and voltage for startup and continued energization of the ultraviolet light source.

A method of supplying electricity using a flow of fluid is described by claim 29 and illustrated in Figure 9. The method comprises providing a housing (142) that includes an inlet (144) and an outlet (146), and supplying a flow of fluid to the inlet (144) of the housing (142). The fluid flows through the housing (142) to the outlet (146). The method further comprises rotating a rotor (112) that is positioned in the housing (142). The position of the rotor (112) in the housing (142) is such that a stator (114) surrounds the rotor (112). In addition, the method comprises channeling the fluid flowing through the housing (142) to the

rotor (112) with a turbine nozzle (140). The turbine nozzle (140) includes a tip (158) and a plurality of struts (160). The method also includes generating electricity with the rotor (112) and the stator (114). The rotation of the rotor (112) induces the generation of electricity.

The method of Claim 37 recites circulating the fluid to a bearing (178) to cool and lubricate the bearing (178). The initial act of adjusting the struts (160) to control the velocity of the flow of liquid is described by Claim 58. Claim 59 describes the initial act of adjusting the struts (160) in order to adjust at least one of the angle of incidence of the liquid on the rotor (112), efficiency, turbulence and pressure drop.

Dynamically adjusting the voltage and current levels of the electricity with a plurality of coils (184) in response to initial energization and continued energization of an ultraviolet light source is recited by the method of Claim 38. Claim 39 describes switching the coils (184) between a parallel configuration and a series configuration. Electrically connecting the coils (184) with a plurality of taps to provide a plurality of voltage levels is recited by Claim 40. Accelerating the hydro-power generation system (12) in the absence of flux concentrators to a first RPM to initially energize an ultraviolet light source, and slowing the hydro-power generation system (12) to a second RPM and a second voltage by continued energization of the ultraviolet light source is recited in claim 41.

VI. Issues

There are two issues presented in this appeal. The first issue is whether Claims 1, 3-6, 8-9, 11-12, 16, 18, 29, 32-35, 37, 41, 54-56, 58 and 59 are anticipated pursuant to 35 U.S.C. § 102(b) by US Patent No. 4,731,545 to Lerner et al. entitled "Portable Self-Contained Power Conversion Unit" (hereinafter "Lerner"). The second issue is whether claims 14-15 and 38-40 are unpatentable pursuant to 35 U.S.C. §103(a) over Lerner in view of common knowledge in the art.

VII. Grouping of Claims

Claims 1, 3, 9, 11, 14-15, 16, 29, 32-33, 37, 38-40, 41, 58 and 59 do not stand or fall together. Accordingly, Applicants identify the grouping of the claims as follows:

Group I: Claim 1, 29

Group II: Claim 3

Group III: Claims 9, 11, 32-33

Group IV: Claims 16, 41

Group V: Claims 14-15, 38-40

Group VI: Claim 37

Group VII: Claim 58-59

VIII. Argument

A. The Statutory Standard

35 U.S.C. § 102(b) provides:

> A person shall be entitled to a patent unless — (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

A 35 U.S.C. § 102(b) rejection must be based on a single prior art reference that shows each and every element of the rejected claim. MPEP 2131, page 2100-68 ("A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co.*, 814 F.2d 628, 631 (Fed. Cir. 1987)). Accordingly, a 35 U.S.C. § 102(b) rejection must be overturned if a single prior art reference does not disclose each and every element recited in the claim.

35 U.S.C. § 103(a) provides:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a

> whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Establishment of a *prima facie* case of obviousness requires 1) there be some suggestion of motivation to modify a reference, 2) there must be a reasonable expectation of success, and 3) the prior art reference must teach or suggest all the claim limitations. MPEP 706.02(j). (Two factors involved in proper analysis pursuant to §103 are "(1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success." *In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991). The suggestion and reasonable expectation must both be found in the prior art, not the disclosure of applicants' specification. *Id.*

Official notice of common knowledge in the art or "well known" prior art that is outside the record may be taken by the Examiner as rationale supporting a *prima facie* case of obviousness. Where the Applicant traverses such official notice, a supporting reference should be cited by the Examiner. MPEP 2144.03. ("....Patent Office appellate tribunals, where it is found necessary, may take notice of facts beyond the record which, while not generally notorious, are capable of such instant and unquestionable demonstration as to defy dispute." *In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970). "Assertions of technical facts in areas of esoteric technology must always be supported by citation to some reference work recognized as standard in the pertinent art and the appellant given in the Patent Office, the opportunity to challenge the correctness of the assertion or the notoriety of repute of the cited reference." *Id.*

B. Overview of Lerner

Lerner discloses a power conversion unit attached to the outlet of a pressurized fluid system, such as, the nozzle of a garden hose. As illustrated in FIGs. 1 and 2 of Lerner, the body (10) of the power conversion unit includes an impeller housing (11) with an impeller (36) located therein. Attached to the impeller housing is a generator (16). An impeller shaft (40) couples the impeller with an armature in the generator, such that rotation of the impeller rotates the armature. (Col. 6 lines 35-37) Rotation of the armature creates a potential difference (power) that is supplied to jacks (19) on the housing. (Col. 6 lines 37-39)

The impeller is rotated by pressurized fluid flowing through a passageway (38) in the housing and striking the impeller. (Col. 4 lines 20-27) The speed of the stream of pressurized fluid flowing into the passageway is adjusted with a throttle valve 44 to change the speed of the impeller. (Col. 6 lines 8-14) The throttle valve is a rotary valve that may be manually rotated with a member handle (62) to adjust the narrowness and thus the speed of the stream of pressurized fluid. (Col. 4 lines 48-58 and Col. 6 lines 8-14)

C. Group I is Patentable Over Lerner

Group I contains Claims 1 and 29. Claim 1 defines a hydro-power generation system that includes a turbine nozzle with a plurality of struts that operate to direct a flow of fluid to a rotor at increased velocity to rotate the rotor. Claim 29 describes a method of supplying electricity using a flow of fluid. The method includes directing the flow of fluid to the rotor with a turbine nozzle that includes a tip and a plurality of struts to increase the velocity of the flow of fluid. The Examiner has asserted that the throttle valve of Lerner comprises a tip and a plurality of struts to direct the flow of liquid and achieve a predetermined angle of incidence on the rotor.

Lerner teaches a rotary valve to control the speed of the liquid, but fails to disclose a turbine nozzle *with a plurality of struts to direct* a flow of fluid. In fact, Lerner teaches that

the stream of fluid is simply narrowed and broadened by rotating the throttle valve. Clearly, the throttle valve of Lerner does not include struts operable to direct the flow of fluid as recited in Claim 1 or for channeling the fluid flowing through the housing as recited in Claim 29.

D. Group II is Patentable Over Lerner

Group II contains Claim 3. Because Claim 3 is dependent from Claim 1, Claim 3 is patentable over Lerner for at least the reasons given above in conjunction with Group I. In addition, Applicants believe this claim is separately patentable over the claims of Group I. Claim 3 recites an additional limitation that is not disclosed by Lerner: that the turbine nozzle directs the flow of fluid to achieve a *predetermined* angle of incidence on the rotor. Lerner teaches only that pressurized fluid will flow through the passage at varying velocity based on rotation of the rotary valve similar to a garden hose to narrow and broaden the passageway through the rotary valve. (Col. 4 lines 54-58) Accordingly, the narrowing and broadening of the passageway with a rotary valve as taught by Lerner will correspondingly change the angle of incidence of the fluid upon the rotor, thereby teaching away from the *predetermined* angle of incidence outlined by Claim 3. Accordingly, Claim 3 has a separate, additional, independent reason establishing patentability over Lerner.

E. Group III is Patentable Over Lerner

Group III contains Claim 9, 11 and 32-33. Because Claims 9, 11 and 32-33 are dependent from Claims 1 and 29 respectively, Claims 9, 11 and 32-33 are patentable over Lerner for at least the reasons given above in conjunction with Group I. In addition, Applicants believe these claims are separately patentable over the claims of Group I. Claims 9, 11 and 32-33 recite additional limitations that are not disclosed by Lerner. Claims 9 and 32 define that the electricity is alternating current. Claims 11 and 33 further define that the alternating current may be rectified to provide direct current. Col. 2 lines 37-45 of Lerner

were cited by the Examiner as disclosing that the generator produces alternating current as in claims 9 and 32, and that the alternating current is rectified to provide direct current as in claims 11 and 33. In fact, Lerner discloses only that the generator is a direct current generator. (Col. 5 lines 57-61) There is no teaching in Lerner of alternating current or rectification of alternating current as in claims 9, 11, 32 and 33. Accordingly, Claims 9, 11 and 32-33 have separate, additional, independent reasons establishing patentability over Lerner.

F. Group IV is Patentable Over Lerner

Group IV contains Claim 16 and 41. Because Claims 16 and 41 are dependent from Claims 1 and 29 respectfully Claims 16 and 41 are patentable over Lerner for at least the reasons given above in conjunction with Group I. In addition, Applicants believe these claims are separately patentable over the claims of Group I. Claims 16 and 41 both recite that the hydro-power generation system operates to accelerate to a first RPM to initially energize an ultraviolet (UV) light source with a first voltage. In addition, claims 16 and 41 recite that continued energization of the UV light source is operable to slow rotation of the hydro-power generation system to a second RPM and produce a second voltage.

As discussed in the specification on page 28 lines 7-23, the hydro-power generation system provides relatively quick acceleration to a predetermined first RPM to initially energize a UV light source with a predetermined first voltage when fluid first begins to flow. The relatively quick acceleration provides an "instant on" capability that may eliminate the need for energy storage devices to power the UV light source. The continued energization of the UV light source is operable to reduce rotation to a predetermined second RPM. The second RPM produces a predetermined second voltage that allows continued energization of the UV light source.

Lerner fails to disclose a UV light source as a load. In addition, Lerner fails to disclose operation of the generator at a first voltage resulting from a first RPM to initially energize a UV light source and a second RPM and corresponding second voltage to continuously energize the UV light source as in claims 16 and 41. Accordingly, Claims 16 and 41 have separate, additional, independent reasons establishing patentability over Lerner.

G. Group V is Patentable Over the Combination of Lerner and Common Knowledge in the Art

Group V contains Claims 14-15 and 38-40. Because Claims 14-15 are dependent from Claim 1 and Claims 38-40 are dependent from claim 29, Claims 14-15 and 38-40 are patentable over Lerner in view of common knowledge in the art for at least the reasons given above in conjunction with Group I. In addition, Applicants believe these claims are separately patentable over the claims of Group I.

The dynamic use of taps or series and parallel coils in a hydro-power generation system to energize and maintain energization of an ultraviolet (UV) light source as recited in claims 14-15 and 38-40 distinguishes the claimed invention from the prior art. The Examiner has asserted that it would have been obvious to one having ordinary skill in the art to adjust the voltage and current levels with a plurality of switchable coils using a plurality of taps. Applicants respectfully disagree that it is common knowledge to use taps within a hydro-power generation system as described by Claims 1 and 29 in connection with a UV light source to provide different levels of electricity to initially energize, and then continue to energize the UV light source as defined by claims 14, 38 and 40. Applicants also disagree that it is common knowledge to utilize a plurality of coils in the hydro-power generation system of Claims 1 and 29 with a UV light source for dynamically switching from a series to a parallel configuration to provide a first voltage to initially energize the UV light source and a second voltage to continue energization of the UV light source as defined by claims 15 and 39.

Applicants have traversed the Examiner's taking of official notice in a previous office action response and have also requested the Examiner to provide evidence in support of his position. Further, Applicants have attached as Exhibit A the declaration of Mr. Karlis Veczíedins. Mr. Veczíedins has 6 years of experience in the field of water treatment systems and hydropower generation, and is familiar with the general knowledge and experience of those skilled in these areas. Mr. Veczíedins has concluded that it is not common knowledge in the art to dynamically operate taps or dynamically switch coils to initially energize and maintain energization of an ultraviolet light source within a hydro-power generation system as claimed.

The Examiner has failed to provide a prior art reference supporting his taking of official notice as described in MPEP 2144.03. Since the Examiner's rational for his official notice is unsupported, the prior art does not teach or suggest all the claim limitations, and the Examiner has failed to establish a prima facie case of obviousness. Accordingly, Claims 14-15 and 38-40 have separate, additional, independent reasons establishing patentability over Lerner in view of common knowledge in the art.

H. Group VI is Patentable Over Lerner

Group VI contains Claim 37. Because Claim 37 is dependent from Claim 29, Claim 37 is patentable over Lerner for at least the reasons given above in conjunction with Group I. In addition, Applicants believe this claim is separately patentable over the claims of Group I.

Claim 37 recites an additional limitation that is not shown in Lerner: circulating fluid to a bearing to cool and lubricate the bearing. In fact, Lerner discloses only that bearings (41A) and (41B) act to seal pressurized fluid inside the body (10). (Col. 5 lines 55-57) Accordingly, Claim 37 has a separate, additional, independent reason establishing patentability over Lerner.

I. Group VII is Patentable Over Lerner

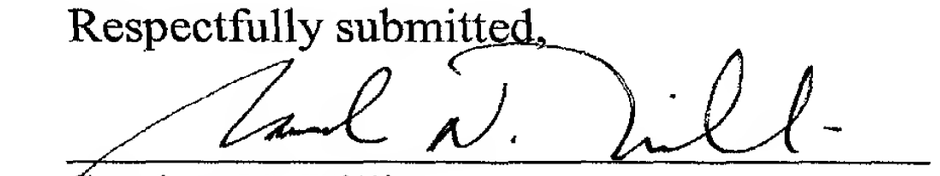
Group VII contains Claims 58 and 59. Because Claims 58 and 59 are dependent from Claim 29, Claims 58 and 59 are patentable over Lerner for at least the reasons given above in conjunction with Group I. In addition, Applicants believe these claims are separately patentable over the claims of Group I. Claim 58 recites the additional limitation of an initial act of adjusting the struts to control the velocity of the flow of liquid. Claim 59 recites the initial act of adjusting the struts in order to adjust at least one of the angle of incidence of the liquid on the rotor, efficiency, turbulence and pressure drop. Lerner does not disclose a turbine nozzle with struts as previously discussed, therefore it follows that Lerner does not teach adjustment of the struts as in Claims 58 and 59. Accordingly, Claims 58 and 59 both have a separate, additional, independent reasons establishing patentability over Lerner.

Conclusion

In summary, the 35 U.S.C. § 102(b) rejections against the claims of Groups I-IV and VI-VII based on Lerner should be overturned. Lerner fails to teach or disclose each and every element of the claims and therefore cannot anticipate the claimed invention. In addition, the 35 U.S.C. § 103(a) rejections of the claims of Group V based on Lerner in view of common knowledge in the art should also be overturned. The claims of Group V are not of common knowledge in the art and therefore a prime facie case of obviousness based on Lerner in view of common knowledge in the art has not been established by the Examiner.

Dated: April 21 2003

Respectfully submitted,



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Attachment: Exhibit A

IX. Appendix

1. (Previously Amended) A hydro-power generation system, comprising:

a housing that includes an inlet and an outlet;

a rotor rotatably positioned within the housing such that the rotor is rotated by a flow of fluid through the housing;

a turbine nozzle fixedly coupled with the housing, wherein the turbine nozzle comprises a tip and a plurality of struts operable to direct the flow of water to the rotor at increased velocity to rotate the rotor; and

a stator fixedly positioned to surround the rotor such that rotation of the rotor induces the production of electricity.

3. (Previously Amended) The hydro-power generation system of claim 1, wherein the turbine nozzle is operable to increase the velocity of the fluid and direct the flow of fluid to achieve a predetermined angle of incidence of the fluid upon the rotor.

4. (Original) The hydro-power generation system of claim 1, wherein the rotor comprises a shaft and a turbine rotor.

5. (Original) The hydro-power generation system of claim 4, wherein the turbine rotor includes a helical ridge.

6. (Original) The hydro-power generation system of claim 4, wherein the turbine rotor includes a plurality of vanes.

7. (Original) The hydro-power generation system of claim 1, wherein the stator is fixedly positioned to surround the housing adjacent the rotor.

8. (Original) The hydro-power generation system of claim 1, wherein the stator is fixedly positioned within the housing to surround the rotor.

9. (Original) The hydro-power generation system of claim 1, wherein the electricity is alternating current.

10. (Original) The hydro-power generation system of claim 9, wherein the rotor comprises a permanent magnet.

11. (Original) The hydro-power generation system of claim 9, wherein the alternating current is rectified to provide direct current.

12. (Original) The hydro-power generation system of claim 1, wherein the electricity is direct current.

13. (Original) The hydro-power generation system of claim 12, wherein the stator comprises a permanent magnet.

14. (Previously Amended) The hydro-power generation system of claim 1, further comprising a plurality of taps and an ultraviolet light source energized with the electricity produced, wherein the taps are dynamically operable to provide different voltage levels of electricity to initially energize and continue to energize the ultraviolet light source.

15. (Previously Amended) The hydro-power generation system of claim 1, further comprising an ultraviolet light source and a plurality of coils, wherein the ultraviolet light source is energized with the electricity produced, and the coils are dynamically switchable from a parallel configuration to a series configuration to provide a first voltage for initial energization and a second voltage for continued energization of the ultraviolet light source.

16. (Previously Amended) The hydro-power generation system of claim 1, wherein the hydro-power generation system is operable without flux concentrators to accelerate to a first RPM to initially energize an ultraviolet light source with a first voltage, wherein continued energization of the ultraviolet light source is operable to slow rotation of the hydro-power generation system to a second RPM and produce a second voltage.

17. (Original) The hydro-power generation system of claim 1, wherein the rotation of the rotor is operable to provide flow-based measurements of the fluid.

18. (Original) The hydro-power generation system of claim 1, wherein the inlet is supplied fluid from a liquid treatment system.

29. (Previously Amended) A method of supplying electricity using a flow of fluid, the method comprising:

providing a housing that includes an inlet and an outlet;

supplying the flow of fluid to the inlet of the housing, wherein the fluid flows through the housing to the outlet;

rotating a rotor that is positioned in the housing such that the rotor is surrounded by a stator, wherein the rotor rotates as a result of the fluid flowing through the housing;

channeling the fluid flowing through the housing to the rotor with a turbine nozzle to increase the velocity of the flowing fluid, wherein the turbine nozzle comprises a tip and a plurality of struts; and

generating electricity with the rotor and the stator, wherein rotation of the rotor induces the generation of electricity.

32. (Original) The method of claim 29, wherein the electricity generated is alternating current.

33. (Original) The method of claim 32, further comprising the act of rectifying the alternating current to provide direct current.

34. (Original) The method of claim 29, wherein the electricity generated is direct current.

35. (Original) The method of claim 29, further comprising the act of charging an energy storage device.

36. (Original) The method of claim 29, further comprising the act of channeling the fluid to the outlet with a plurality of exit guide vanes.

37. (Original) The method of claim 29, further comprising the act of circulating the fluid to a bearing to cool and lubricate the bearing.

38. (Previously Amended) The method of claim 29, further comprising the act of dynamically adjusting the voltage and current levels of the electricity with a plurality of coils in response to initial energization and continued energization of an ultraviolet light source by the electricity generated.

39. (Original) The method of claim 38, further comprising the act of switching the coils between a parallel configuration and a series configuration.

40. (Original) The method of claim 38, further comprising the act of electrically connecting the coils with a plurality of taps to provide a plurality of voltage levels.

41. (Previously Amended) The method of claim 29, further comprising the acts of accelerating the hydro-power generation system in the absence of flux concentrators to a first RPM to initially energize an ultraviolet light source; and slowing the hydro-power generation system to a second RPM and a second voltage by continued energization of the ultraviolet light source.

53. (Previously Added) The hydro-power generation system of claim 1, wherein the stator comprises a plurality of exit guide vanes and a fin, the exit guide vanes and the fin cooperatively operable to channel the flow of fluid to the outlet.

54. (Previously Added) The hydro-power generation system of claim 1, wherein the housing comprises a first section and a second section, the first section detachably coupled with the second section to facilitate assembly and maintenance.

55. (Previously Added) The hydro-power generation system of claim 54, wherein the rotor and stator are disposed in the second section and the turbine nozzle is disposed in the first section.

56. (Previously Added) The hydro-power generation system of claim 1, wherein the fluid is drinking water.

58. (Previously Added) The method of claim 29, comprising the initial act of adjusting the struts to control the velocity of the flow of liquid.

59. (Previously Added) The method of claim 29, comprising the initial act of adjusting the struts in order to adjust at least one of the angle of incidence of the liquid on the rotor, efficiency, turbulence and pressure drop.

Certificate Under 37 CFR 1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first-class mail in an envelope addressed to: The Commissioner for Patents, Washington, D.C. 20231 on April 21, 2003.

Barbara LaBarge

PATENT
Case No.: 3086/1230 (BH 2068)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)
)
David W. Baarman, et al.)
)
Serial No.: 09/680,345)
)
Filed: October 5, 2000)
)
For: HYDRO-POWER GENERATION)
FOR A WATER TREATMENT SYSTEM)

Group Art Unit: 2834

Examiner: Pedro J. Cuevas

DECLARATION SUPPORTING APPEAL BRIEF

I, Karlis Vecziedins hereby declare that:

1. I am an electrical engineer with six (6) years of experience in the field of water treatment systems and hydro-electric power generation. I graduated from Ferris State University in 1989 with a degree in electrical engineering. Upon graduation, I was employed by Robert Shaw Controls as a controls engineer. Currently, I am employed by Alticor, Inc. My title is currently Research Scientist. My job responsibilities include electrical engineering and design engineering in the development of water treatment systems.

2. Since 1997 I have worked with about thirty (30) designers, engineers and other technicians who are involved in the design and application of water treatment systems and hydro-power generation systems. This experience has provided me with the opportunity to observe others working in this field of endeavor. As a result of this experience, I believe I am well acquainted with a sufficient number of people to assess the skill level of persons of ordinary skill in the art of the design and application of water treatment systems and hydro-power generation systems.

3. I have reviewed US Patent Application Serial No. 09/680,345 filed on October 5, 2000.

4. I have reviewed US Patent No. 4,731,545 to Lerner et al. issued on March 15, 1988 that is attached as Exhibit 1.

5. I believe that dynamically operating taps or dynamically switching coils to initially energize and maintain energization of an ultraviolet light source within a hydro-power generation system is not common knowledge in the art based on the following facts:

a) It is well known to those of ordinary skill in the art that an ultraviolet light source includes an opaque housing containing a gaseous vapor.

b) It is further well known that an ultraviolet light includes a cathode that emits electrons into the vapor to generate ultraviolet light.

c) It is also well known to include a ballast circuit to energize and maintain energization of an ultraviolet light source. Application Guide To Lamp Control Gear, p. 15, Philips, Printed in the Netherlands, 1997 (Exhibit 2)

d) The following well-known prior art reference related to hydro-power generation systems fails to teach, suggest or disclose dynamically switching the coils of a hydro-power generation system between a series configuration and a parallel configuration to initially energize and maintain energization of an ultraviolet light source. In addition, the reference fails to teach, suggest or disclose dynamically operating taps within a hydro-power generation system to provide different voltage levels of electricity to initially energize and continue to energize an ultraviolet light source.

i) Steam and Gas Turbines, Dr. A. Stodola, Peter Smith, New York 1945

e) None of the following prior art references related to ultraviolet light sources and electrical circuits teach, suggest or disclose initial energization and continued energization of an ultraviolet light source by dynamically switching the coils of a

hydro-power generation system between a series configuration and a parallel configuration. In addition, none of the prior art references teach, suggest or disclose initial energization and continued energization of a ultraviolet light source by switching coils between a series configuration and a parallel configuration.

i) Application Guide To Lamp Control Gear, Philips, Printed in the Netherlands, 1997 (Exhibit 2).

ii) Electronics Sourcebook for Technicians and Engineers, Milton Kaufman, Arthur H. Seidman, 1988 McGraw-Hill, Inc.

iii) Electronics Pocket Handbook, Second Edition, Daniel L. Metzger, 1992 Prentic-Hall, Inc.

iv) Elements of Electromagnetics, Second Edition, Matthew N. O. Sadiku, 1995 Oxford University Press, Inc.

v) The Engineering Handbook, Richard C. Dorf, 1996 CRC Press, Inc.

vi) Introduction to Electric Circuits, Second Edition, Richard C. Dorf, 1993 John Wiley & Sons, Inc.

vii) Design of Solid State Power Supplies, Third Edition, Eugene R. Hnatek 1989, Van Nostrand Reinhold

viii) Electronic Devices and Circuit Theory, Third Edition, Robert Boylestad, Louis Nashelsky, 1982 Prentice-Hall, Inc.

ix) Encyclopedia of Electronic Circuits, Volume 4, Rudolf F. Graf, William Sheets, 1992 McGraw-Hill, Inc.

x) Electronics in Industry, Fifth Edition, George M. Chute, Robert D. Chute, 1979 McGraw-Hill, Inc.

xi) Power Supplies, Switching Regulators, Inverters, and Converters, Second Edition Irving M. Gottlieb 1994 McGraw-Hill, Inc.

xii) Microelectronics, Second Edition, Jacob Millman, Arvin Grabel, 1987 McGraw-Hill, Inc.

f) It is well known that manufacturing of electrical power systems for ultraviolet light sources require compliance with industry safety standards. Within the following list of industry safety standards, there are no standards related to hydropower generation systems dynamically switching the coils of a hydro-power

generation system between a series configuration and a parallel configuration to initially energize and maintain energization of an ultraviolet light source. In addition, there are no standards related to dynamically operating taps within a hydro-power generation system to provide different voltage levels of electricity to initially energize and continue to energize an ultraviolet light source.

i) IEC 60920 Ballasts For Tubular Fluorescent Lamps - General And Safety Requirements, IEC 60920, International Electrotechnical Commission (IEC), Rev. 90 1995.

ii) IEC 60155 Glow-Starters For Fluorescent Lamps, IEC 60155, International Electrotechnical Commission (IEC), Rev. 93, 1995.

iii) IEC 60928 Auxiliaries For Lamps - AC Supplied Electronic Ballasts for Tubular Lamps - General And Safety Requirements, IEC 60928, International Electrotechnical Commission (IEC), Rev. 99, 1999.

g) I have never heard of, read about, nor seen a publicly disclosed hydro-electric power generation system that initially energizes and continues to energize an ultraviolet light source by dynamically operated taps in the hydro-electric power generation system.

h) I have never heard of, read about, nor seen a publicly disclosed hydro-electric power generation system that dynamically switches coils in the hydro-electric power generation system from a parallel configuration to a series configuration to provide a first voltage for initial energization and a second voltage for continued energization of an ultraviolet light source.

It is therefore my belief that it is not common knowledge in the art to dynamically operate taps in a hydro-power generation system to provide different voltage levels to initially energize and continue to energize an ultraviolet light source. Further, it is my belief that dynamically switching the coils in a hydro-power generation system between a parallel configuration and a series configuration to provide a first voltage for initial energization and a second voltage for continued energization of an ultraviolet light source is not common knowledge in the art.

Serial No.09/680,345 Filed: October 5, 2000

I hereby declare under penalty of perjury that the foregoing is true and correct.

4-21-03
Date:

Karlis Veczliedins

Attachments: Exhibit 1 (US Patent No. 4,731,545)
Exhibit 2 (Application Guide to Lamp Control Gear)

United States Patent [19]

Lerner et al.

[11] **Patent Number: 4,731,545**

[45] **Date of Patent: Mar. 15, 1988**

[54] **PORTABLE SELF-CONTAINED POWER CONVERSION UNIT**

[75] Inventors: **Hal Lerner; Bhikhabhai J. Desai; Suresh B. Desai,** all of Huntington Park, Calif.

[73] Assignee: **Desai & Lerner,** Huntington Park, Calif.

[21] Appl. No.: **840,430**

[22] Filed: **Mar. 14, 1986**

[51] **Int. Cl.**[4] **H02P 9/04;** F03D 9/00; F03B 13/00

[52] **U.S. Cl.** ..... **290/54;** 290/43; 416/185; 416/197 A; 416/197 B; 417/348; 340/320; 322/35

[58] **Field of Search** ..... 290/53, 42, 54, 43, 290/52; 416/197 A, 197 B, 185, 187, 188, 158; 417/348, 349; 415/80, 87; 340/320; 322/35

[56] **References Cited**

U.S. PATENT DOCUMENTS

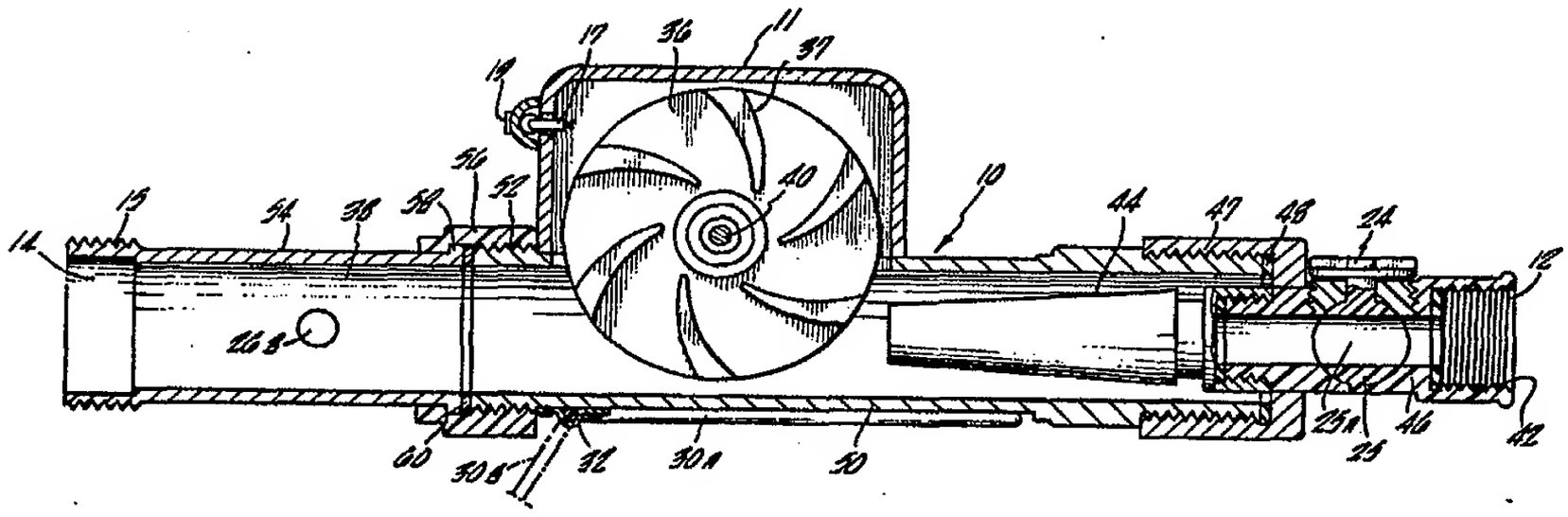
96,573	11/1869	Andrews	416/197 B
2,276,714	3/1942	Brown	290/54
2,436,683	2/1948	Wood, Jr.	290/54
3,750,001	7/1973	McCloskey	320/61
3,845,291	10/1974	Portyrata	240/26
4,142,367	3/1979	Guisti	60/325
4,182,123	1/1980	Ueda	290/54 X
4,272,685	6/1981	Toyama	290/52
4,352,025	9/1982	Troyen	290/54
4,392,063	7/1983	Lindquist	290/54
4,488,055	12/1984	Toyama	290/53

Primary Examiner—William M. Shoop, Jr.
Assistant Examiner—Sharon D. Logan
Attorney, Agent, or Firm—Lyon & Lyon

[57] **ABSTRACT**

A portable, self-contained power conversion unit is disclosed that is attached to an outlet for a pressurized fluid system, such as the nozzle for a garden hose. An impeller mounted in the body of the unit and is rotated by the discharge of pressurized fluid through the unit. The rotational energy of the impeller is converted into electrical energy by a generator, and/or used directly in rotating tools attached to the impeller, such as grinding wheels, rotary saws, rotary brushes, drill bits, and the like.

17 Claims, 5 Drawing Figures



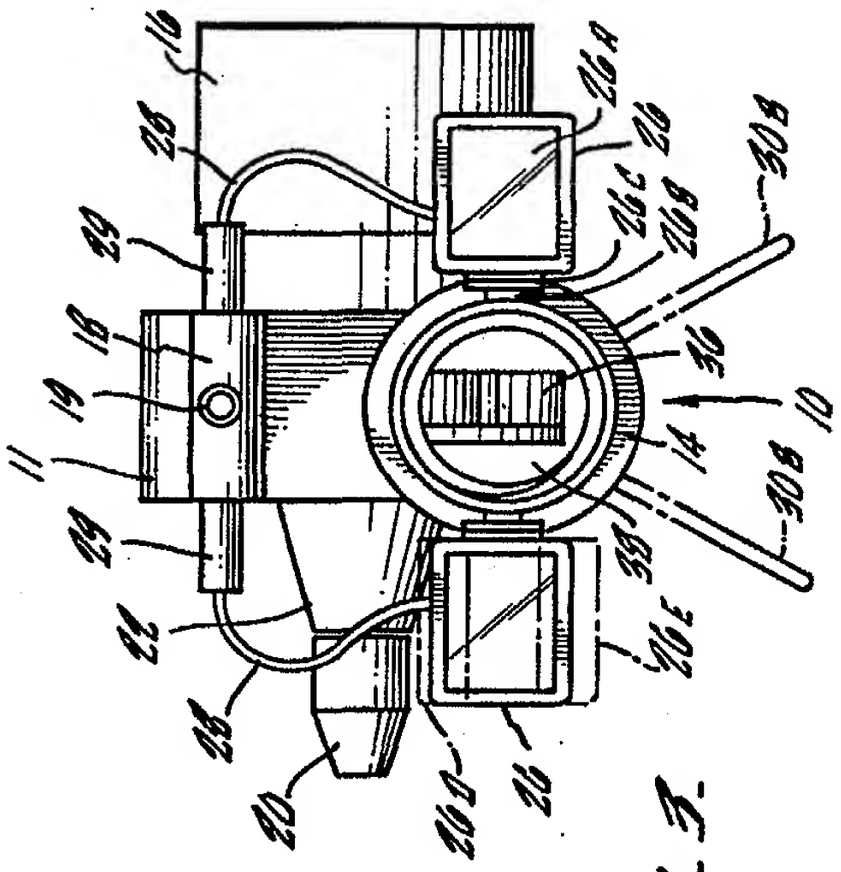


FIG. 3

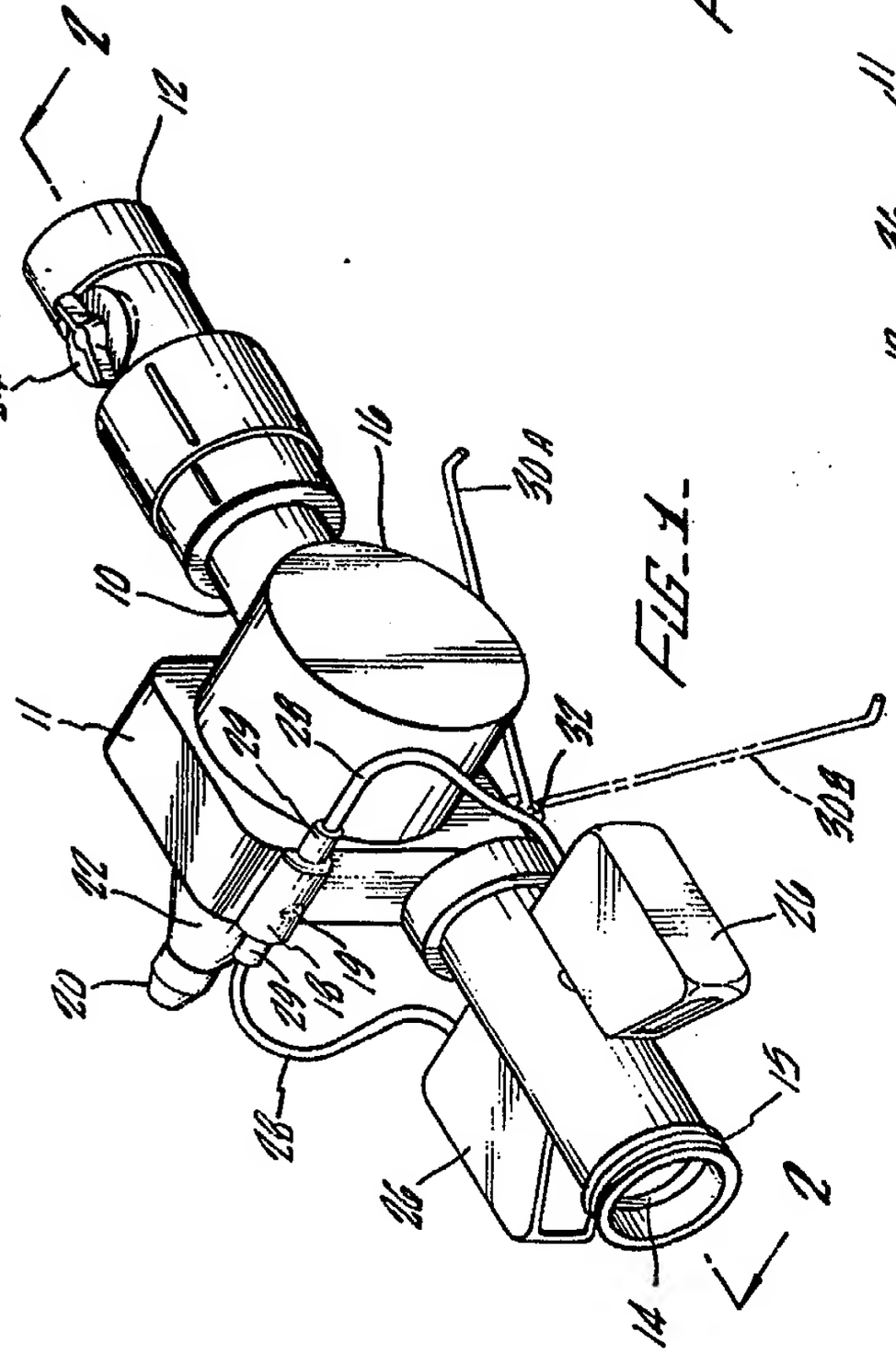


FIG. 4

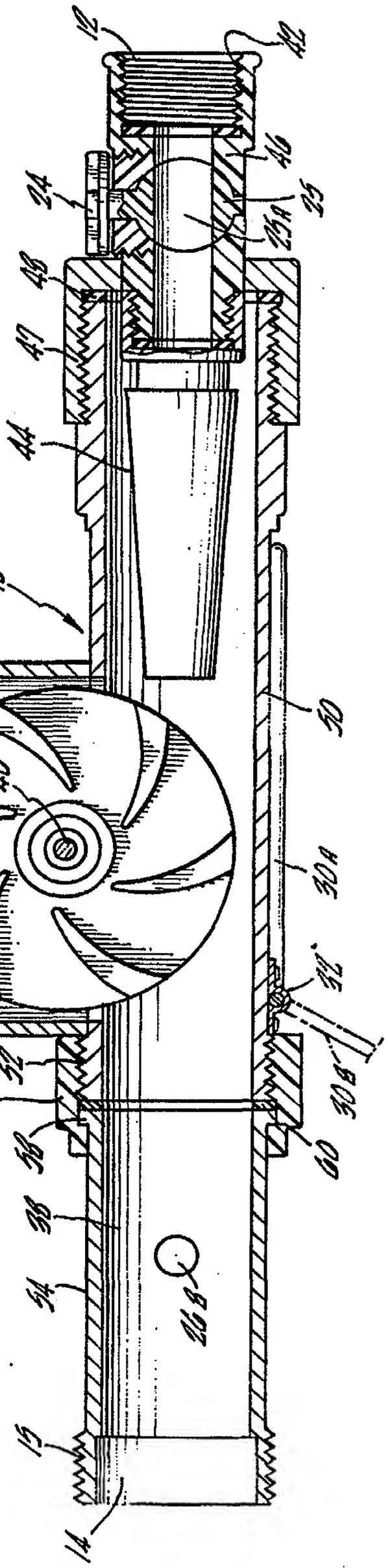


FIG. 2

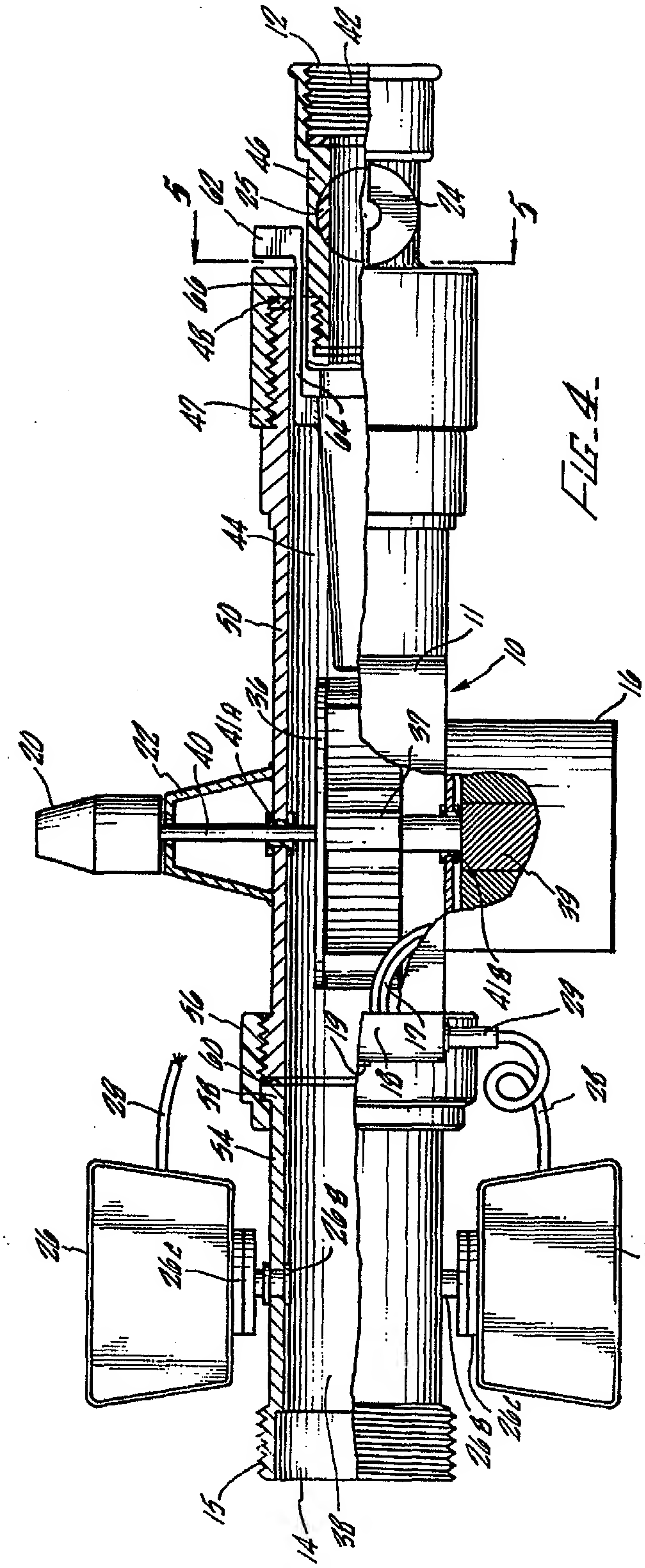


FIG. 4

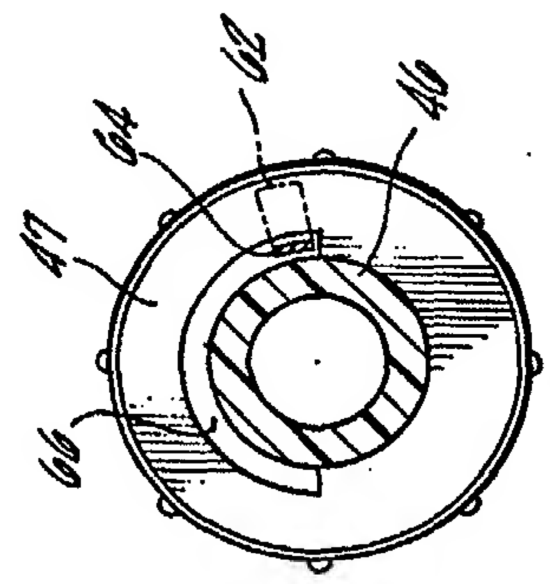


FIG. 5

PORTABLE SELF-CONTAINED POWER CONVERSION UNIT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of the invention is that of devices which convert the energy of pressurized fluid into other, more useful, forms of energy, and particularly portable energy-conversion devices which attach to outlets of pressurized fluid supply systems.

2. Description of the Prior Art

Sources of pressurized fluid are commonly available. Important examples are the water supply systems found in modern households and cities, the water mains systems supplying fire hydrants, and farm irrigation systems that operate on the basis of natural artesian pressure or pump-supplied pressure. The difference between the fluid's pressure and ambient atmospheric pressure indicates that a difference in potential energy exists. This difference in potential energy can be converted into kinetic energy when the pressurized fluid is discharged to the atmosphere. The kinetic energy so obtained is inherent in the resulting movement of the fluid.

Watering one's lawn will serve as an example of the above. When the faucet or valve is opened, pressurized water from the household's water supply system enters the hose and travels to the nozzle at the end of the hose. Typically, this nozzle contains a throttle valve which creates a passage for exit of the water that is narrower than the hose itself. A large pressure difference will then exist between the inlet and outlet ends of this passage. The outlet end of the exit passage will be at atmospheric pressure and the inlet end will be at nearly the base pressure of the water supply system, particularly if the hose is of significantly larger diameter than the exit passage of the nozzle. As a result of this large pressure difference in a short distance the velocity of the water will swiftly increase as it exits the nozzle. The water thus gains kinetic energy, as may be expected in this practical application of Bernoulli's law.

The kinetic energy of the water in the example given above is principally used in directing the water to various parts of one's lawn, garden, automobile, and other places or items to be watered or washed. Devices are known which use the kinetic energy of the water to power the movement of a sprinkler across a lawn. This kinetic energy could be used for other purposes.

A number of devices have been invented which convert some of the kinetic energy available from a pressurized fluid system into another, and more useful, form of energy. For example, U.S. Pat. No. 3,845,291 to Portyrata discloses a water-powered swimming pool light which comprises a turbine element located in the filtered water return line of a swimming pool. The turbine element powers a generator that in turn supplies electrical power to a lamp assembly mounted in the side of the pool. A permanent installation is contemplated in this patent.

U.S. Pat. No. 3,750,001 to McCloskey disclosed a remote, self-contained power supply apparatus for powering a pressurized-liquid distributing and disseminating system. A turbine element in a bypass line powers a generator which recharges electric storage means that in turn powers electrically operated valves in the main pipe. Again, a permanent installation is indicated.

U.S. Pat. No. 4,142,367 to Guisti discloses a domestic water pressure-flow powered generator system for connection to a domestic water system supply pipe. Whenever water is drawn from the system, a fluid motor is rotated which powers a generator. The generator recharges a bank of batteries or powers household appliances. Again, a fixed and permanent installation is disclosed.

U.S. Pat. No. 4,352,025 to Troyen discloses a system for generating electrical power that utilizes a hydroelectric generator located in the basement of a high-rise building and is powered by the flow of water in the clean wastewater line of the building. A fixed installation is disclosed.

The mechanisms for conversion of fluid flow energy described above all require permanent installations. Frequently, the mechanisms are bulky and immovable. None of these mechanisms are portable and may be installed as needed, where needed on an ad hoc basis. All convert fluid flow energy only into electrical energy. The present invention overcomes these limitations.

SUMMARY OF THE INVENTION

The present invention is a portable, self-contained power-conversion unit for attachment to a source of pressurized fluid. The invention comprises a body having a passage for transmission of fluid, an inlet end, and an outlet end, the passage joining the inlet end and the outlet end in order to permit flow of pressurized fluid from the inlet end to the outlet end, the inlet end being attachable to the source of pressurized fluid and the outlet end being at ambient atmospheric pressure, and an impeller rotatably mounted in the body and protruding into the passage so that the impeller is rotated by the flow of pressurized fluid through the passage.

The impeller may supply rotational energy to a generator and/or rotary tools. The generator may power illumination units or other electric appliances, including electric pumps. A chuck for releasable attachment of rotatable tools may be rotated by the impeller, so that a variety of rotary tools can be powered by the invention. Examples of such rotary tools include rotary saws, grinding wheels, rotary wire brushes, drill bits, centrifugal or positive displacement pumps, and the like.

The embodiment of the invention containing a generator is believed to be of particular value for emergency and field application, owing to its portability, simple construction, and easy installation. Electric power may be supplied at remote locations having a source of pressurized fluid, such as in a farmer's irrigated fields. The embodiment of the invention incorporating a generator can supply emergency electrical power in a power outage when electric power is not available but a source of pressurized fluid is. The invention may be used in nozzles for firemen's hoses, in which case a generator can power illumination units attached to the nozzle, so that firemen can see where they are pointing the nozzle. This would be especially valuable in dark or smoky conditions. The same concept may be used for garden hoses, so that homeowners can water their lawns at night. Watering lawns at night is preferred for saving water by reducing evaporative losses. The power-conversion unit of the invention may also be adapted to be powered by a source of pressurized gas, such as compressed air or liquified propane.

Thus, an object of the invention is to provide a portable, self-contained power-conversion unit that may be

attached to a source of pressurized fluid and provide useful electrical or mechanical power when and where needed.

The more important features and objects of the invention have been outlined very broadly. Additional features and objects of the invention exist that will be set forth hereinafter in the detailed description of the preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the preferred embodiment of the invention;

FIG. 2 is a sectional view of the preferred embodiment of the invention, generally taken along section plane 2—2;

FIG. 3. is a plan view of the outlet end of the preferred embodiment of the invention;

FIG. 4 is a plan view of the top of the preferred embodiment of the invention, with a partial cut-away of the main body of the same to reveal the interior; and

FIG. 5 is a sectional view of the preferred embodiment of the invention taken along section plane 5—5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment of the invention shown here is designed for use with a garden hose and or the like and may be attached to the usual threaded coupling on the end of such a hose. Thus, the pressurized fluid used in the preferred embodiment is water and its source is the household water supply system. The invention may also be incorporated into the nozzle of a fireman's hose, or designed for attachment to an agricultural irrigation system, among other applications. The invention includes all of these applications but is not limited thereto.

FIG. 1 in the drawings depicts a perspective view of the preferred embodiment of the invention. Body 10 is the overall housing of the preferred embodiment of the invention, which is formed of several parts as will be discussed in connection with FIGS. 2 and 4 below. The body has an inlet end 12 and an outlet end 14 and is provided with outward end threading 15 for attachment of extension tubes to narrow the stream of fluid emerging from the outlet end 14.

A part of body 10 is formed as impeller housing 11. Generator 16 is attached to impeller housing 11 on one side (not shown) thereof; the output of the generator is supplied to generator jack housing 18. Generator jack housing 18 has three jacks 19 which serve as attachment for plugs on power cables which lead to electrical appliances such as illumination units 26. On one side of impeller housing 11, on the left as seen in FIG. 1, is located chuck 20 which projects from guard 22. Rotary tools may be removably attached to chuck 20; the chuck is of the sort commonly found on electric hand-held drills. On the side of the body 10 which has inlet end 12 may be seen an on/off valve handle 24.

Illumination units 26 are located on either side of body 10, in front of generator 16 and impeller housing 11. The direction "front" or "forward" is defined in terms of the flow of pressurized fluid through the body 10, which proceeds from inlet end 12 to outlet end 14. Forward refers to the downstream direction; rearward refers to an upstream direction. These illumination units 26 are supplied with electrical power by illumination unit power cables 28 which end in plugs 29. Plugs 29 are intended to be inserted into jacks 19 to provide electrical power from generator 16 to illumination units 26.

Underneath body 10 may be seen a bipod which is shown in its retracted position 30A and, in phantom, in its extended position 30B. The bipod is attached to the body 10 by bipod swivel 32. The bipod supports the power-conversion unit at a slight angle with respect to the horizontal when the unit is placed on the ground or other surface.

Proceeding now to FIG. 2 in the drawings, which is a cross-section of the preferred embodiment of the invention taken generally along section plane 2—2 in FIG. 1, one may observe some of the detail of the interior of the preferred embodiment of the invention. Passage 38 is the generally cylindrical passage of varying diameter between inlet end 12 and outlet end 14 of body 10. Mounted on body 10 may be seen inlet housing 11 in which is located impeller 36. Impeller 36 mounts curved impeller blades 37. Impeller 36 is fastened to and rotates with impeller shaft 40. Thus, as pressurized fluid flows through passage 38 from inlet end 12 to outlet end 14, impeller 36 is rotated about impeller shaft 40 in a clockwise direction (as seen in FIG. 2) due to the impact of the pressurized fluid on impeller blades 37. Some of the linear kinetic energy of the pressurized fluid is converted thereby into rotational kinetic energy of impeller 36. Tests on a prototype of the invention reveal that the positioning of the impeller 36 within the passage 38 as shown in FIG. 2 does not significantly diminish the force and stream of the fluid emerging from the outlet end 14.

Generator jack housing 18 is mounted on the exterior of impeller housing 11. One of the jacks 19 is visible in FIG. 2. Electric potential (and current) is supplied to jacks 19 from the generator 16 by generator jack wires 17.

At inlet end 12 may be seen inlet end attachment threading 42 which comprises means that permit the power conversion unit to be attached to the threaded end of a garden hose or the like. Inlet end attachment threading 42 is formed in first cylinder 46, which, as with the rest of the components of body 10 described in detail below, may be made of polyvinyl chloride (PVC) plastic, aluminum, or the like. First cylinder 46 contains on/off valve sphere 25 which is formed integrally with on/off valve handle 24 and contains valve passage 25A. This valve permits the flow of pressurized fluid to be shut off completely.

Throttle valve 44 is threaded onto first cylinder 46. Throttle valve 44 may be any of a number of rotary throttle valves known to persons of ordinary skill in the art, such as those used on garden hoses to narrow or broaden the stream of water emerging from the end of the garden hose. Rotation of the throttle valve 44 about its axis, which lies generally along the axis of passage 38, will cause the throttle valve 44 to narrow or widen the diameter of its interior passage (not shown) through which the pressurized fluid flows.

First cylinder 46 is glued (PVC) or welded (metal) to first cylinder threaded sleeve 47. Threaded sleeve 47 permits attachment of first cylinder 46 to second cylinder 50. Between second cylinder 50 and first cylinder 46 is disposed washer 48 for the purpose of sealing. On the other end of second cylinder 50, the left end as seen in FIG. 2, is threading 52 which permits attachment of second cylinder 50 to third cylinder 54 by means of an attachment sleeve 56. Attachment sleeve 56 screws on to threading 52 and presses against flange 58 on third

cylinder **54** so as to as wedge and join together second cylinder **50** and third cylinder **54**. A second washer **60** permits sealing between second cylinder **50** and third cylinder **54**.

FIG. **3** is a plan view of the outlet end of the preferred embodiment of the invention. One may observe the generally cylindrical generator **16** attached to impeller housing **11** on which is located generator jack housing **18**. One of the jacks **19** is shown in the middle of generator jack housing **18**; no plug is shown emplaced in middle jack **19**. On either side of the generator jack housing **18** are additional jacks occupied by plugs **29** which in turn are electrically connected to illumination unit power cables **28** which supply electrical power to illumination units **26**.

As seen from this end, the illumination units **26** display their lamp glasses **26A** and also the mechanism by which they are attached to body **10**. Illumination unit swivels **26B** rotate about an axis at right angle to the axis of passage **38** and are made of a ferromagnetic metal. Swivels **26B** fit into holes in third cylinder **54**. Illumination unit magnets **26C** are permanently attached to the sides of illumination units **26** and permit the illumination units **26** to be attached to swivels **26B** through magnetic action. This permits a removable attachment of illumination units **26** to illumination unit swivels **26B**. Therefore, the illumination units **26** may be removed from swivels **26B** in order to be aimed in directions not permitted by rotation about swivels **26B**. The illumination unit **26** may be rotated upwardly (**26D**, in phantom) and downwardly (**26E**, in phantom).

Looking at outlet end **14** in FIG. **3** one may observe passage **38** head on. Impeller **36** may be seen located within passage **38**. On the left chuck **20** projects from impeller housing **11**, with guard **22** covering the distance between chuck **20** and impeller housing **11**.

FIG. **4** is a plan view of the top of the preferred embodiment of the invention with a partial cut-away of body **10** to reveal passage **38**, as well as partial cutaways of the generator **16** and guard **22**. This particular drawing permits one to observe the mechanism by which illumination units **26** are fastened to third cylinder **54**. Swivel **26B** is clearly seen to be rotatably attached to third cylinder **54**. Magnets **26C** permit removable attachment of illumination units **26** to swivels **26B**.

As in FIG. **2**, the impeller **36** may be seen to be directly in front of the throttle valve **44**. The impeller **36** is attached to and rotates with shaft **40**. Shaft **40** rotates about an axis at right angle to the direction of flow of the pressurized fluid through passage **38**. Shaft **40** projects from the side of body **10** and is attached to chuck **20**. Chuck **20** permits the removable attachment of rotary tools of various kinds to the end of shaft **40**. Guard **22** protects operators from rotating impeller shaft **40**. Bearings **41A** and **41B** both seal pressurized fluid inside body **10** and act as bearings for impeller shaft **40**. On the other side of impeller **46** from chuck **20** may be seen direct current generator **16** which is of a sort well known to the art, equipped with an armature **39**, permanent magnets (not shown), and commutator brushes (not shown). Generator jack power wires **17**, which electrically connect the generator **16** to jacks **19**, are partially visible in the cut-away of impeller housing **11**.

On/off valve handle **24** may be seen on the right, as well as on/off valve sphere **25**. This valve is in the open position permitting passage of pressurized fluids through it en route to throttle valve **44**. Inlet end attachment threading **42** is clearly seen. FIG. **4** shows the means by which the operator can adjust the flow of pressurized fluid through throttle valve **44**. This consists of a throttle valve adjustment member **64** which is welded to throttle valve **44**. At the other end of throttle valve adjustment member is handle **62** which projects from body **10** through opening **66**.

As is more clearly seen in FIG. **5**, the operator may turn throttle valve adjustment member handle **62** (shown in phantom) in order to rotate throttle valve **44** and thus adjust the narrowness (and speed) of the stream of pressurized fluid (not shown) emerging from throttle valve **44** and striking the impeller **36**. This affects the speed of rotation of impeller **36**. The throttle valve adjustment member projects through throttle valve adjustment member opening **66** formed in flange **47**.

The preferred embodiment of the invention is operated as follows. First, the power-conversion unit is attached to a source of pressurized fluid, such as a garden hose, by threading the hose and the unit together via inlet end attachment threading **42**. The power-conversion unit is small and light in weight. Thus, it is easily portable and can be held and directed much as one would hold and direct an ordinary nozzle for a garden hose. Other applications, such as for a fireman's hose, may require larger and heavier versions of the power-conversion unit but would still be portable.

On/off valve handle **24** is rotated to permit passage of pressurized fluid through the on/off valve and onward into the throttle valve **44**. Throttle valve adjustment member handle **62** is turned by the operator to produce the desired narrowness of pressurized fluid stream emerging from the throttle valve **44**, which in turn controls the rate of rotation of impeller **36**. As impeller **36** is rotated the armature in the generator is likewise rotated and a potential difference created thereby. This potential difference is supplied to jacks **19** by means of wires **17**. If desired, the plugs **29** of illumination units **26** may be inserted in jacks **19** to power illumination units **26** and provide light. In their normal position, the illumination units **26** are fastened by magnets **26C** to swivels **26B** pointing the illumination units in a generally forward direction to illuminate the subject ahead of the unit and its operator. Thus, the target of the pressurized fluid stream from the outlet end **14** of the unit will be made visible at night or in poor lighting conditions. If desired, other electrical appliances may be powered by plugs inserted in jacks **19**. Example of such appliances are transistor radios and battery charging units. Alternatively, or in addition, a rotary tool such as a drill bit, a rotary sander, a grinding wheel, a rotary saw, a rotary brush, a centrifugal pump, or a positive displacement pump may be inserted and locked into chuck **20** to perform the various functions of these rotary tools.

Although the preferred embodiment of the invention contains both the generator **16** and the chuck **20** attached to shaft **40** of the impeller **36**, one or the other may be eliminated as desired. The particular form of the impeller and its blades, and the positioning of its axis of rotation may be varied without departing from the spirit and scope of the invention. For example, the blades of the impeller could be straight and not curved. The impeller could be shaped as a turbine or screw and made to rotate about an axis parallel to the axis of passage **38**, which may require some gearing to transfer rotational power outside body **10**. Many other variations are possible.

Thus, a portable, self-contained power-conversion unit has been provided. Those skilled in the art will appreciate that the conception upon which this disclosure is based may be used as a basis for the designing of other structures, for carrying out the several purposes of the invention. The claims, therefore, should be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention, which is intended to be defined by the appended claims.

What is claimed is:

1. A portable, self-contained power-conversion unit, for attachment to a source of pressurized fluid, comprising:

(a) a body having a passage for transmission of fluid, an inlet end, and an outlet end, the passage joining the inlet end and the outlet end in order to permit flow of pressurized fluid from the inlet end to the outlet end, the inlet end being attachable to the source of pressurized fluid and the outlet end being at ambient atmospheric pressure;

(b) an impeller rotatably mounted in the body and protruding into the passage so that the impeller is rotated by the flow of pressurized fluid through the passage; and

(c) a generator mounted on and supported by the body and attached to the impeller so that rotation of the impeller causes rotation of an armature in the generator in order to generate electric power.

2. The power-conversion unit according to claim 1 in which a rotary tool projecting from the body is attached to the impeller so that rotation of the impeller rotates the rotary tool.

3. The power-conversion unit according to claim 1 further comprising a plurality of illumination units attached to and supported by the body and electrically connected in circuit with the generator to be supplied with electrical power by the generator.

4. The power-conversion unit according to claim 3 in which the plurality of illumination units are detachable from the body.

5. A portable, self-contained power-conversion unit, for attachment to a source of pressurized fluid, comprising:

(a) a body having a passage for transmission of fluid, an inlet end, and an outlet end, the passage joining the inlet end and the outlet end in order to permit flow of pressurized fluid from the inlet end to the outlet end, the inlet end being attachable to the source of pressurized fluid and the outlet end being at ambient atmospheric pressure;

(b) an impeller rotatably mounted in the body and protruding into the passage so that the impeller is rotated by the flow of pressurized fluid through the passage; and

(c) a rotary tool projecting from the body and attached to the impeller so that rotation of the impeller rotates the rotary tool.

6. The power-conversion unit according to claim 5 further comprising a plurality of generator jacks mounted on the body for electrical attachment of a plurality of electric appliances to be powered by the generator.

7. The power-conversion unit of claim 6 in which one or more of the electric appliances are illumination units.

8. The power-conversion unit according to claim 1, 5 or 2 further comprising a chuck for releasably engaging rotating tools, the chuck being rotatably attached to the body and attached to the impeller so that rotation of the impeller causes rotation of the chuck.

9. A portable, self-contained power-conversion unit, attachable to a source of pressurized fluid, comprising:

(a) a body having a passage for transmission of fluid from the source of pressurized fluid to ambient atmospheric pressure, an inlet end, and an outlet end, the passage joining the inlet end and the outlet end, the inlet end including connecting means for removable attachment of the body to the source of pressurized fluid;

(b) an impeller having a shaft, the impeller being mounted in the body rotatable about the shaft and protruding into the passage so that the impeller intercepts and is rotated by the flow of pressurized fluid through the passage; and

(c) a throttle valve mounted in the passage between the inlet end and the impeller, the throttle valve controlling the velocity of the fluid intercepted by the impeller.

10. The power-conversion unit according to claim 9 further comprising a generator having an armature, the armature being attached to a first end of the shaft of the impeller so that rotation of the impeller causes rotation of the armature.

11. The power-conversion unit according to claims 9 or 10, further comprising a chuck for releasably engaging rotary tools, the chuck being rotatably mounted on the body, and engaged to the impeller so that rotation of the impeller rotates the chuck.

12. The power-conversion unit according to claim 11 in which the chuck is mounted on a second end of the shaft of the impeller.

13. The power-conversion unit according to claim 10 further comprising a plurality of illumination units attached to the body and in circuit with the generator in order to be powered thereby, the illumination units being attached to the body and capable of providing illumination in a direction generally the same as that taken by fluid leaving the outlet end of the body.

14. The power-conversion unit according to claim 13 in which the illumination units are releasably attachable to the body.

15. A portable, self-contained power-conversion unit, attachable to a source of pressurized fluid, comprising:

(a) a body having a passage joining an inlet end and an outlet end of the body, the passage allowing the passage of pressurized fluid from the inlet end to the outlend end, the inlet end having attachment means for joining the source of pressurized fluid to the body;

(b) an impeller having blades and a shaft, the impeller being mounted in the body and rotatable about the shaft, the shaft being at subsequently right angles to the direction of passage of the pressurized fluid through the passage;

(c) a generator attached to the shaft and mounted on a first side of the body;

(d) a chuck attached to the shaft and mounted on a second side of the body; and

(e) a throttle valve located within the body between the inlet end and the impeller and controlling the diameter of the passage at one point or points, the throttle valve being rotatable within the body so as to control the velocity of fluid emerging from the throttle and striking the impeller.

16. The power-conversion unit of claim 15 further comprising illumination units removably attached to the body and electrically powered by the generator.

17. The power-conversion unit of claim 16 further comprising a bipod mounted on the body for supporting the power-conversion unit.

* * * * *

JAN VAN OVERVELD
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Roosendaal.

Application guide to lamp control gear

e.g. 'TL', CFL, QL, Halogen

PHILIPS

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2 GENERAL ASPECTS

2.1 MAIN BALLAST FUNCTIONS

The optimum functioning of fluorescent lamps largely depends on the properties of the control gear used. (Obviously the opposite is equally true). Like all gas-discharge light sources, fluorescent lamps cannot function properly when they are operated directly on the mains supply voltage. Certain electrical and/or electronic devices have to be built into the lamp circuit, either in the lamp itself or externally in the form of what is called control gear. The control gear performs a number of functions:

- it limits and stabilises the lamp current, a necessary measure in view of the negative resistance characteristic of gas-discharge lamps (i.e. when the lamp current increases, the lamp voltage will decrease),
- it ensures that the lamp continues to operate despite the fact that twice during each frequency cycle of the mains supply the voltage is zero,
- it provides the ignition voltage (higher than the normal operation voltage) for the initial lamp starting,
- it supplies controlled energy to heat the lamp electrodes during ignition (warm start ballasts) and in some cases also during normal operation (regulating ballasts).

In addition to these basic functions, the control gear must fulfil a number of other, equally important requirements:

- it must ensure a sufficiently high power factor,
- it must limit the harmonic distortion of the mains current,
- it must present a high impedance to frequencies used for switching purposes in automatic frequency regulation circuits (AFRC or Arcadis) in outdoor applications, if possible,
- it must offer adequate suppression of any electromagnetic interference (EMI) that might be produced by the lamp/ballast system and that could otherwise interfere with other electronic equipment,
- it must limit the short-circuit current and/or the current during running-up of the lamp to protect the lamp electrodes from overloading,
- it must switch off the lamps when these cannot be ignited normally. This safety requirement is only valid for the HF ballasts,
- it must limit the lamp voltage, lamp current and lamp power within the specifications during mains voltage variations.

Finally, there is a third group of requirements dictated by the needs of both luminaire manufacturer and user: to have control gear of small dimensions, long life, low losses (also with a view to controlled temperature) and a non-audible noise level.

With the electromagnetic control gear system, various separate components including ballast, starter, capacitors and filter coils fulfil all these requirements together with the lamp.
In the case of the electronic HF ballast, and also in the QL induction lighting system, all the above-mentioned functions have been integrated into one electronic device, which might be called the 'black box'.

2.2 LUMINAIRE CLASSIFICATIONS

Three basic classifications

There are basically three ways of classifying luminaires as far as their design and construction are concerned:

1) According to the sort of protection offered against electric shock, i.e. electrical safety.

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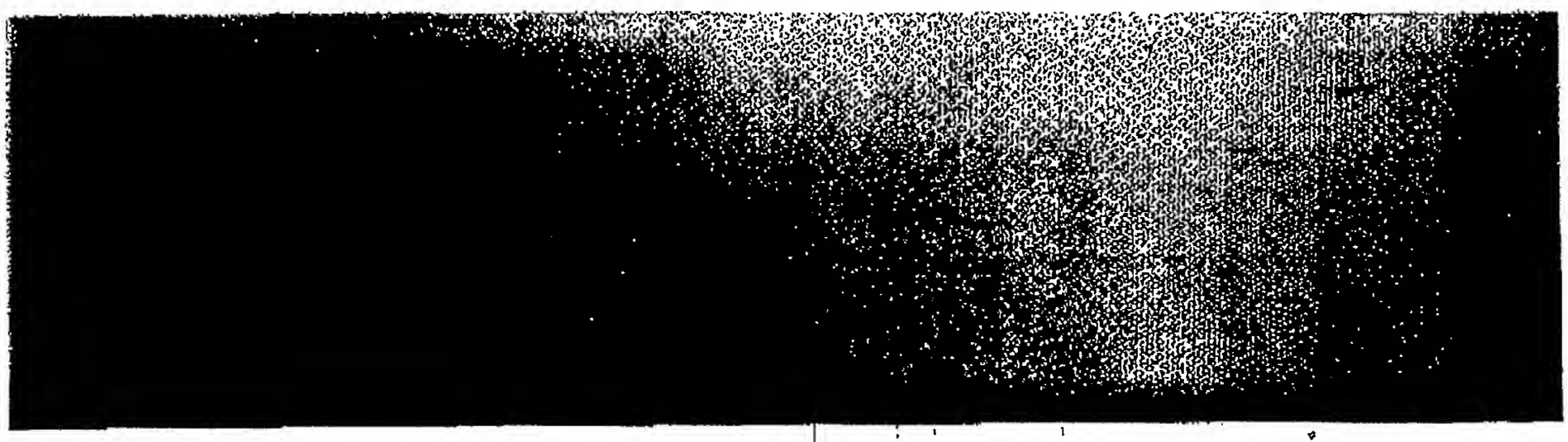

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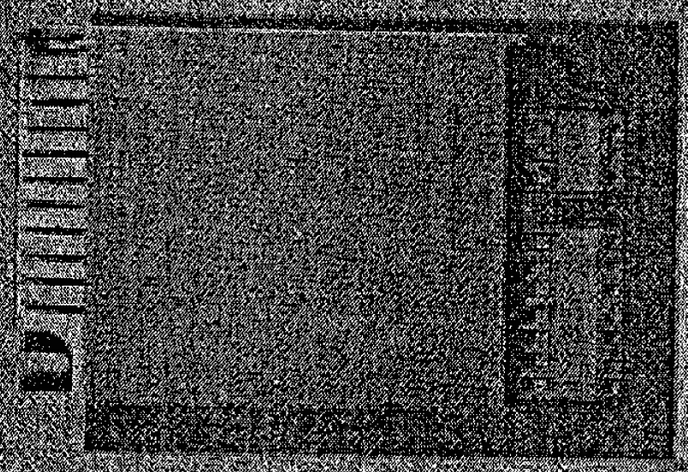

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